

## Tokay Gecko Mass

Natalie D. Mylniczenko, MS, DVM, Ann Manharth, DVM  
Lincoln Park Zoo, PO Box 14903, Chicago, IL 60614-4712, USA

**KEY WORDS:** endolymphatic organ, calcium, calcium storage organ, Tokay gecko, *Gekko gekko*, chalk sac

The purpose of this section is to provide cases that challenge the reader to develop diagnostic plans, therapeutic regimens and case diagnoses. Both medical and surgical cases are encouraged. Figures, such as radiographs or ultrasounds, are highly recommended, but not necessary. Submissions should include an introduction, diagnosis and discussion of the case. Please contact Dr. Paul Gibbons, DVM, Section Editor, University of California, Davis, Veterinary Medical Teaching Hospital, Companion Avian and Exotic Pet Medicine and Surgery Service, One Shields Avenue, Davis, CA 95616, 530-752-1393, Fax 530-752-9620, regarding publishing requirements or radiographs, histopathology and clinical pathology results.

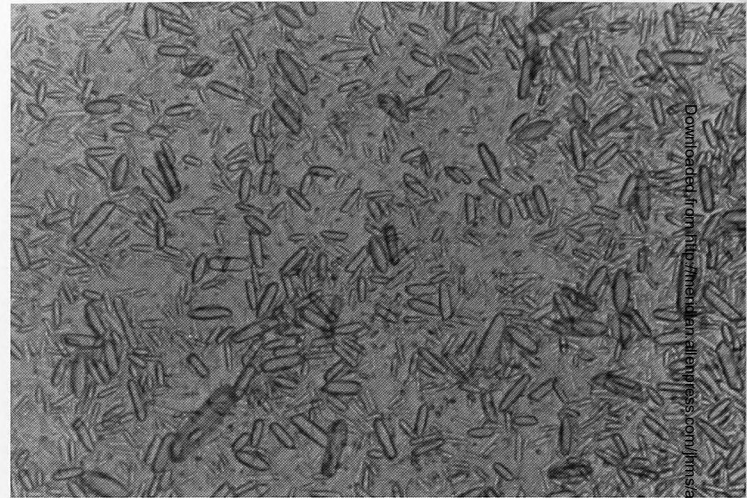
### HISTORY

A 70 g, captive-bred, four-year-old, female Tokay gecko, *Gekko gekko*, was presented with a left cranial cervical mass. The animal was housed in a 3 x 3 x 4.5 m zoological exhibit with three other Tokay geckoes and two Burmese pythons, *Python molurus bivittatus*. Ambient temperature (maintained by a thermostatically controlled room heating system) in the exhibit was 25°C (77°F) with an approximately 29°C (85 °F) daytime basking area. Light was provided by full spectrum fluorescent lamps (Vita-lite, Duro-Test Canada Company, Ontario, Canada) and black lights (SLI Inc., El Paso, TX). Both lamps were illuminated for 12 hr daily. Access to basking sites and hiding spots precluded daily observation. Pre-fed (Cricket meal, Zeigler Bros, Inc., Gardners, PA), dusted (calcium carbonate, Livingston Stone Co., Pontiac, IL) crickets, *Acheta domestica*, seven to ten-day-old mice, *Mus musculus*, and wax worms, *Galleria mellonella*, were offered alternately three times per week.

The only previous medical problem reported in this animal was complete tail loss and regeneration. Yearly fecal examinations by floatation (Fecasol, EVSCO Pharmaceuticals, Buena, NJ) and acid fast stain for cryptosporidia (Remel, Inc., Lenexa, KS) were negative. Ecdysis and weight had been unremarkable.

On physical examination a round, moderately firm, 2.5 cm, subcutaneous mass was found just caudal to the ramus of the left mandible, and an associated ipsilateral pharyngeal swelling was also noted. No eggs were palpable within the coelomic cavity, and no other abnormalities were noted.

In light of the history and physical examination findings, the lizard was manually restrained for venipuncture and aspiration of the mass. Whole blood was collected from the ventral caudal vein into a heparinized 1 ml syringe with a 25 ga needle and submitted for a complete blood count (CBC) (Table 1). Aspiration of the mass with a 25 ga needle on a 3 cc syringe produced 2.5 ml of opaque white fluid that was submitted for examination by light microscopy (Figure 1).



**Figure 1.** Photomicrograph (400x original magnification) of opaque white fluid aspirated from a unilateral mass located just caudal to the left mandible of an adult female Tokay gecko, *Gekko gekko*.

**Table 1.** Complete blood count from a Tokay gecko, *Gekko gekko*, with a left-sided, round, 2.5 cm, fluid-filled cranial cervical mass.

Parameter	Result
Plasma Protein (g/l)	106
(mg/dl)	10.6
PCV %	26
Leukocytes (x10 <sup>3</sup> /μL)	12.0
Heterophils (x10 <sup>3</sup> /μL)	4.8 (40%)
Lymphocytes (x10 <sup>3</sup> /μL)	1.2 (10%)
Monocytes (x10 <sup>3</sup> /μL)	3.1 (26%)
Basophils (x10 <sup>3</sup> /μL)	2.9 (24%)

**EXAMINE TABLE 1 AND FIGURE 1. MAKE A LIST OF DIFFERENTIAL DIAGNOSES, DETERMINE IF ADDITIONAL DIAGNOSTIC TESTS ARE INDICATED, AND DEVELOP A TREATMENT PLAN BEFORE CONTINUING.**

## DIAGNOSIS

The initial differential diagnosis list included abscess (foreign body, aural, or dental), cyst, neoplasia, hematoma, normal endolymphatic organ, abnormal endolymphatic organ (sac rupture or duct obstruction), hyperparathyroidism (Marcus, 1981), osteomyelitis, and osteodystrophy. The estimated total white blood cell count and differential (Table 1) were evaluated using Wright-Giemsa stained (EM Industries, Inc., Savannah, GA) blood smears. The monocyte count (3,120/ $\mu$ L) was elevated according to reference ranges available from ISIS (International Species Information System, Apple Valley, MN). Monocytosis could indicate chronic or granulomatous inflammation, but in this sample the distinction between monocytes and lymphocytes was reported to be difficult. The use of heparin as an anticoagulant can lead to cell clumping and interference with Wright-Giemsa staining (Murray, 2000). These artifacts affect cellular morphology and could have led to increased reporting of monocytes in this case. Other CBC values were unremarkable.

Both the subcutaneous mass and the oral cavity swelling were greatly reduced after aspiration. Light microscopic evaluation of a thin smear of the aspirate (Figure 1) revealed numerous birefringent truncated prismatic crystals with expressed surfaces (resembling long thin prisms). The crystals were identified as calcium carbonate although it can take on many shapes, including ovoid, round, dumbbell, or spheroid with radial striations, depending upon environmental factors (Marmo, *et al.*, 1981, Osborne, *et al.*, 1990). No cells were identified on the smear.

A capillary tube of the aspirate was centrifuged and the solids represented 33% of the volume (measured using a microhematocrit scale). Total solids of the supernatant were 43 g/l (4.3 mg/dl) (refractometer) and calcium was 7.5 mmol/l (30 mg/dl) (Vitros DT6011 Analyzer, Johnson and Johnson, Rochester, NY). Blood calcium levels and other serum chemistries were not performed due to an insufficient amount of plasma, and blood collection attempts were discontinued to reduce the risk of tail autotomy.

The mass was determined to be an endolymphatic organ based on anatomic location, crystal morphology, and measured calcium in the aspirate. Nine months after presentation, the patient died of bacterial pneumonia (*Salmonella* sp. isolated). Histopathology of the left endolymphatic duct showed dense mature fibrous connective tissue, and the right duct was unremarkable. The final morphologic diagnosis was left endolymphatic duct fibrosis and sac dilation.

## DISCUSSION

Gekkonid lizards possess unique adaptations for calcium homeostasis. Endocrine regulation of calcium occurs in the kidney, cellular bone, and endolymphatic sacs (also known as chalk sacs or calcium storage organs). These sacs contain calcium carbonate and are reservoirs for calcium ions. Additionally, bicarbonate ions in the fluid serve to buffer the blood following dissociation from calcium ions in response to metabolic demands (Norris, 1987). The endolymphatic sac is a diverticulum of the utricle, one of the two divisions of the membranous labyrinth of the inner ear (Baird, 1970,

Hildebrand, 1974). It has no apparent function for hearing, but may play a role in equilibrium (Baird, 1970).

Tokay geckos have a defined seasonal breeding pattern in the wild lasting four to five months; females usually lay eggs every month during that time (Wagner, 1980). Prior to breeding, the endolymphatic organs of gekkonids can enlarge. These sacs then reduce in size as calcium is mobilized into the bloodstream for deposition into yolk and mineralization of the eggshell (Bellairs and Kamal, 1981). In the case presented here, one chalk sac was dilated, while the contralateral sac showed no evidence of enlargement. Although unilateral swelling of the chalk sacs could be normal, the enlargement was considered abnormal because it had been present for several weeks without egg development.

Radiographs taken several days after the initial presentation were not remarkable. Other diagnostic testing that could have been performed included biopsy of the mass, regional ultrasonography, computed tomography of the head and neck, and aerobic, anaerobic, and fungal culture of the aspirate. None of these options were pursued because the initial diagnosis did not indicate an invasive or infectious process and the mass did not recur. The gecko was closely monitored for several weeks after presentation and showed no abnormalities or evidence of discomfort during that time.

## ACKNOWLEDGMENTS

Special thanks to Joel Pond, CVT for assistance with diagnostics and Robyn Barbiers, DVM (Lincoln Park Zoo, Chicago, Illinois) for reviewing this case.

## REFERENCES

- Baird, IL. 1970. Anatomy of the Reptilian Ear. In Gans C (ed): Volume 2 Morphology B: Biology of the Reptilia. Academic Press Inc., London:201-2, 207, 239-40.
- Bellairs Ad'A and Kamal, AM. 1981. The Chondrocranium and the Development of the Skull in Recent Reptiles. In Gans C (ed): Volume 11 Morphology: Biology of the Reptilia. Academic Press Inc., London:26.
- Hildebrand M. 1974. Sense organs. In Vertebrate Anatomy. John Wiley and Sons, Inc., Etobicoke, Ontario, Canada:397-9.
- Marcus LC. 1981. Veterinary Biology and Medicine of Captive Amphibians and Reptiles. Lea and Febiger, London, England:181.
- Marmo F, Franco E, Balsamo G. 1981. Scanning electron microscopic and X-ray diffraction studies of otoconia in the lizard *Podarcis s. sicula*. Cell Tissue Res, 218:265-270.
- Murray, MJ. 2000. Reptilian blood sampling and artifact considerations. In Fudge AM (ed): Laboratory Medicine: Avian and Exotic Pets. WB Saunders, Co. Philadelphia, PA:189.
- Norris DO. 1997. Regulation of Calcium and Phosphate Homeostasis. In Vertebrate Endocrinology. Academic Press, Inc, San Diego, CA:565-6.
- Osborne CA, Davis, LS, Sanna J, Unger LK, O'Brien TD, Clinton CW, Davenport, MP. 1990. Identification and interpretation of crystalluria in domestic animals: a light and scanning electron microscopic study. Veterinary Medicine, 85(1):18-37.
- Wagner, E. 1980. Gecko husbandry and reproduction. In Murphy JB, Collins JT (eds): Reproductive Biology and Diseases of Captive Reptiles. Society for the Study of Amphibians and Reptiles, Contributions to Herpetology, 1:115-7.